ENVIRONMENTAL INDICATOR DETERMINATION REPORT CURRENT HUMAN EXPOSURES UNDER CONTROL (CA-725) FOR DTI WAYNESBORO PLANT WAYNESBORO, VIRGINIA

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EXECUTIVE SUMMARY

E.I. duPont de Nemours and Company (DuPont) conducted an evaluation of the environmental indicator (EI) "current human exposures under control" (EI RCRIS Code CA-725) for the DuPont Textile and Interiors (DTI) fibers plant, located in Waynesboro, Virginia. The EI determination evaluation was completed in accordance with the guidance established by the United States Environmental Protection Agency (USEPA) (USEPA, 1999) and is summarized in the scoresheet beginning on the following page.

The EI determination process concluded that releases or the potential for releases identified from Resource Conservation and Recovery Act (RCRA) corrective action units at the Waynesboro Facility do not constitute a significant threat to human health. As a result, a positive EI determination for EI CA-725 was reached, indicating that human exposures are under control.

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION Interim Final 2/5/99

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA-725)

Current Human Exposures Under Control

Facility Name:	**DTI Waynesboro Plant**
Facility Address:	**Waynesboro, Virginia**
Facility EPA ID #:	**VAD003114832**

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

 _X_ If yes – check here and continue with #2 below.
 ____ If no - re-evaluate existing data, or
 ____ If data are not available skip to #6 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While final remedies remain the long-term objective of the RCRA Corrective Action program, the EIs are near-term objectives that are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Current Human Exposures Under Control" EI is for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and does not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration/Applicability of EI Determinations

EI determination status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be **"contaminated"**[1] above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

	Yes	No	?	Rationale/Key Contaminants
Groundwater	X			Using the USEPA's Maximum Concentration Levels (MCLs), USEPA Region III Risk-based Screening Concentrations (RBCs) for tap water, and Virginia Groundwater Standard (VGS) [DuPont Corporate Remediation Group (CRG), 2003], groundwater is identified for further evaluation. Mercury is the key constituent. Note that use of the drinking water values is a conservative measure since groundwater is not used as drinking water (see Section 4.1).
Air (indoors)[2]		X		Groundwater with detected VOCs occurs only at Warehouse No. 3 near the Incinerator Area (SWMU 4). The levels in groundwater are not expected to cause exceedance of Occupational Health and Safety Administration (OSHA) permissible exposure levels (PELs). This has been confirmed with calculated target groundwater concentrations corresponding to acceptable indoor air concentrations (below PELs) using the USEPA Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (see Appendix C). No compounds were found to exceed the target groundwater concentrations. Indoor air is not identified as a concern (see Section 4.2).
Surface Soil (e.g., <2 ft)	X			On site, analytical results for surface soil were compared to USEPA Region III RBCs for industrial direct contact with soil. Mercury exceeded this criterion at two areas in the plant and arsenic at one area. Off-site floodplain sample results were compared to the RBCs for residential direct contact. Off-site soils were identified for further evaluation based on mercury (see Section 4.3).
Surface Water		X		Analytical results for surface-water samples from the South River were compared to the Virginia water quality standard and/or the National Recommended Water Quality Criteria (see Appendix A). Analytical results for mercury (the key contaminant) do not exceed the surface-water screening criterion. However, surface water is retained for further evaluation based on professional judgment (see Section 4.4).
Sediment		X		Sediment sampling and analysis indicate detected mercury at elevated concentrations in core samples 1 to 2 feet below streambed. USEPA has not developed human health risk-based levels for sediments, and none are proposed here. The most likely exposure route is dermal. RAGS Part E advises against developing dermal criteria for metals other than arsenic and cadmium. Due to the presence of detectable mercury, sediments are identified for further evaluation (see Section 4.5).
Subsurf. Soil (e.g., >2ft)	X			Analytical results for subsurface soil were compared to USEPA Region III RBCs for industrial direct contact with soil. Analytical results that exceed screening levels include mercury, arsenic and one result for dioxin/furan (see

[1] "Contamination" and "contaminated" describe media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

[2] Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

	Yes	No	?	Rationale/Key Contaminants
				Section 4.6).
Air (outdoors)		X		Emissions to outdoor air could result from volatilization of impacted soil and/or dust emission. As compared to the indoor air assessment, outdoor air involves greater mixing and dilution with ambient air, and, as such, volatile emissions to outdoor air are not expected to cause concentrations above applicable standards (see Section 4.7).

____ If no (for all media) – skip to #6, and enter "YE," status code after providing or citing appropriate "levels," and referencing sufficient supporting documentation demonstrating that these "levels" are not exceeded.

_X_ If yes (for any media) – continue after identifying key contaminants in each "contaminated" medium, citing appropriate "levels" (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

____ If unknown (for any media) – skip to #6 and enter "IN" status code.

Rationale and Reference(s):

Additional rationale and references are provided in Section 4 of this report.

3. Are there complete pathways between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table

Contaminated Media	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food[3]
Groundwater	No	No	No	Yes			
Surface Soil (e.g., <2 ft)	Yes	Yes	No	Yes	No	Yes	No
Surface Water	No	No	No	No	No	No	Yes
Sediment	No	No	No	No	No	No	No
Subsurf. Soil (e.g., >2ft)	No	No	No	Yes			

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors' spaces for Media which are not "contaminated") as identified in #2 above.

2. Enter "yes" or "no" for potential "completeness" under each "Contaminated" Media--Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential "Contaminated" Media - Human Receptor combinations (Pathways) do not have check spaces ("___"). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

[3] Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

____ If no (pathways are not complete for any contaminated media-receptor combination) -skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

__X__ If yes (pathways are complete for any "Contaminated" Media - Human Receptor combination) – continue after providing supporting explanation.

____ If unknown (for any "Contaminated" Media – Human Receptor combination) skip to #6 and enter "IN" status code Rationale and Reference(s):

Rationale and Reference(s):
Potential Human Receptors include:

(1) On-site workers may have incidental contact with surface soils
(2) On-site construction workers may have incidental contact with groundwater, surface and subsurface soils
(3) Off-site residents may have incidental contact with surface floodplain soils
(4) Recreational users may have incidental contact with floodplain soils

Potentially Complete Pathways by Media

(1) **Groundwater**: On-site construction worker – potential direct contact with groundwater. The potential for exposure is low. Based on a review of existing information, there are no drinking water wells that draw water from the impacted aquifer. Waynesboro Plant policy and land-use controls prohibit construction-related excavation activities in areas of suspected shallow groundwater contamination without appropriate health and safety measures that control exposure (see Sections 5.1.3 and 5.1.4)

(2) **Surface Soil (e.g., <2 feet)**: On-site industrial workers, construction workers – direct contact. The Waynesboro Plant is an active industrial facility. Access to the Plant Area is controlled by a combination of fences and manned security gates, severely restricting access to these areas by trespassers or recreational users. On occasion both workers and construction workers could be exposed to surface soil at a few areas of the plant (see Sections 5.1.3 and 5.1.4).

    Off-site residential and recreational users – direct contact. Potential residential and recreational exposure to surface soil is limited to downstream areas on the South River Floodplain (see Section 5.1.3). No licensed day care facilities have been identified in the impacted areas of the floodplain (see Section 5.1.1).

(3) **Surface Water**: Recreation users via ingestion of fish. Recreational use of the South River (boating, fishing) at impacted areas is possible, resulting in potential exposure via "food" (see Section 5.1.3).

(4) **Subsurface Soil (e.g., >2 feet)**: Construction workers – direct contact. The Waynesboro Plant is an active industrial facility. On occasion, construction workers could be exposed to subsurface soil in areas where excavations have occurred (see Sections 5.1.3 and 5.1.4). However, the site has institutional controls in place that requires permission before excavation or working in the subsurface. The facility also has a specific procedure (which includes occupational air monitoring) for dealing with potential contact with mercury in the subsurface.

4. Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **"significant"**[4] (i.e., potentially "unacceptable" because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable "levels" (used to identify the "contamination"); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable "levels") could result in greater than acceptable risks)?

__X__ If no (exposures can not be reasonably expected to be significant (i.e., potentially "unacceptable") for any complete exposure pathway) – skip to #6 and enter "YE" status code after explaining and/ or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

____ If yes (exposures could be reasonably expected to be "significant" (i.e., potentially "unacceptable") for any complete exposure pathway) – continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

____ If unknown (for any complete pathway) - skip to #6 and enter "IN" status code.

Rationale and Reference(s):

Groundwater Water Exposure Pathways (Section 6.1.4): The on-site excavation/utility worker is potentially exposed to constituents in groundwater during the repair of subsurface utility lines. The complete exposure pathway for the on-site excavation/utility worker includes incidental ingestion and dermal contact with groundwater. The Waynesboro Plant policy prohibits worker and construction disturbance of the subsurface (and groundwater) without appropriate health and safety measures that control exposure. Accordingly, although incidental exposure is possible, such exposures are considered insignificant.

Surface Soil Exposure Pathways (Section 6.1.1): On-site exposure to industrial and construction workers are not expected to be significant. Mercury and arsenic were detected in surface soil above screening criteria. The areas are covered with asphalt or gravel cover, and there is minimal exposure potential. The Waynesboro Plant policy and land-use controls prohibit worker disturbance of impacted surface soil areas without appropriate health and safety measures that control exposure. Accordingly, incidental worker or construction exposure to impacted surface soil is considered insignificant (see Section 6.1.1).

Current off-site exposures to floodplain soil are not considered significant due to low level mercury concentrations observed in the near surface soil and few exceedances of the residential RBC. The combination of potential exposure and average mercury concentrations support a finding that 'residents' and 'recreation' exposures are insignificant (see Section 6.1.1).

Surface Water Exposure Pathways (Section 6.1.3): Although surface water does not exceed the screening criteria, "contaminated" fish are present in the South River. There is a fish consumption advisory for mercury in place, and the river has a voluntary catch-and-release program. The advisory is enforced by the VA Dept of Health through posted signs and monitored by the VA Fish and Inland Game and the VADEQ. A recent creel study conducted by the VA Fish and Inland Game Commission indicated adherence to the catch-and-release program (Bowman, 1997)

Subsurface Soil Exposure Pathways (Section 6.1.2): Waynesboro Plant policy and land-use controls prohibit worker and construction disturbance of impacted subsurface soil areas without appropriate health and safety measures that control exposure. Site investigations and plant operational activities have identified the presence of free mercury in soil at SWMU 1, the Mercury Recovery Area and at SWMU 4, the Incineration Area. If encountered during excavation activities, free mercury would potentially present an exposure risk. Much of these areas are covered by pavement, gravel, and tank farm containment dikes, so the potential for exposure to soil is minimized. Furthermore, the plant has established controls on excavation and requires air space monitoring for mercury vapors during intrusive activities in these areas

[4] If there is any question on whether the identified exposures are "significant" (i.e., potentially "unacceptable") consult a human health Risk Assessment specialist with appropriate education, training and experience.

and the use of appropriate personal protective equipment if free mercury is observed. With these controls in place, the potential for exposure is considered insignificant (see Section 6.1.2).

5. Can the "significant" **exposures** (identified in #4) be shown to be within **acceptable** limits?

_____ If yes (all "significant" exposures have been shown to be within acceptable limits) –continue and enter "YE" after summarizing and referencing documentation justifying why all "significant" exposures to "contamination" are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

_____ If no (there are current exposures that can be reasonably expected to be "unacceptable")- continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure.

_____ If unknown (for any potentially "unacceptable" exposure) – continue and enter "IN" status code.

Rationale and Reference(s):

6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA-725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

X YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the **DuPont Waynesboro facility**, EPA ID # **VAD003114832,** located at **400 DuPont Boulevard, Waynesboro, VA 22980**, under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

____ NO - "Current Human Exposures" are NOT "Under Control."

____ IN - More information is needed to make a determination.

Completed by (signature) [signature] Date 10-1-03
(print) MICHAEL A JACOBI
(title) ENVIR. ENGR.

Supervisor (signature) [signature] Date 10/1/03
(print) Deborah R Goldblum
(title) Acting Branch Chief - RCRA General Operations
(EPA Region or State) Region 3

Locations where References may be found:

Contact telephone and e-mail numbers
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final note: the human exposures EI is a qualitative screening of exposures and the determinations within this document should not be used as the sole basis for restricting the scope of more detailed (e.g., site-specific) assessments of risk

1.0 INTRODUCTION

1.1 Background

The DuPont Textiles and Interiors (DTI) Waynesboro Plant (site) has been designated by the United States Environmental Protection Agency (USEPA) as one of the Corrective Action (CA) Baseline facilities as part of the agency's efforts to comply with the 1993 Government Performance Results Act (GPRA). Compliance with the GPRA for the Resource Conservation and Recovery Act (RCRA) CA Program is measured by achieving a positive determination with two environmental indicators (EIs): (1) "current human exposures under control" (EI RCRIS Code CA-725) and (2) "groundwater contamination under control" (EI RCRIS Code CA-750). As a "Baseline" facility, it is desired that compliance with the two relevant EIs be achieved by 2005. The EIs are snapshots in time, looking at conditions that exist at the time of the EI determination. To achieve a positive determination for the "Current Human Exposure Under Control" EI, it must be demonstrated that no exposure to *humans* exist above acceptable risk-based levels under *current* land and groundwater use.

DuPont submitted a Data Summary Report documenting the RCRA Facility Investigation (RFI) that has been completed at the site [DuPont Corporate Remediation Group (CRG), 2003]. As a follow-up to the RFI report, this document focuses on information that helps demonstrate that the site has current human exposures under control.

1.2 EI Determination Process

In 1999, the USEPA developed guidance to assist in the EI determination process (USEPA, 1999). The guidance document provides the EI evaluator with a scoresheet to document EI determinations. This scoresheet was completed in the following stepped approach:

- ❑ Step 1—*Has all available relevant/significant information on known and reasonably suspected releases... subject to RCRA Corrective Action... been considered in this EI determination?*
- ❑ Step 2—*Are groundwater, soil, surface water, sediments, or air media known or reasonably suspected to be "contaminated" above appropriately risk-based "levels"...from releases subject to RCRA Corrective Action?*
- ❑ Step 3—*Are there complete pathways between "contamination" and human receptors such that exposures can be reasonably expected under current (land- and groundwater-use) conditions?*
- ❑ Step 4—*Can the exposures from any of the complete pathways identified in Step 3 be reasonably expected to be "significant"?*
- ❑ Step 5—*Can the "significant" exposures (identified in Step 4) be shown to be within acceptable limits?*
- ❑ Step 6—*EI Determination Conclusion*

1.3 Report Purpose and Contents

The objective of this report was to provide the results of the EI CA-725 determination completed for the site. The EI CA-750 determination will be addressed in a separate report.

This report is presented in nine sections:

- Section 1, this section, provides the background and purpose of the document.
- Section 2 contains site history and physical setting.
- Section 3 describes the data review and usability (Step 1).
- Section 4 describes the risk-based screening (Step 2).
- Section 5 describes the complete exposure pathways (Step 3).
- Section 6 contains the exposure assessment (Step 4).
- Section 7 describes the risk characterization (Step 5).
- Section 8 contains the EI determination conclusion (Step 6).
- Section 9 contains the references cited in this report.

Information provided in this report (and its accompanying Executive Summary, Tables, Figures, and Appendices) is based upon current knowledge and data available.

2.0 SITE DESCRIPTION AND SETTING

The following sections include a brief description of the Waynesboro Plant. Information included in these sections is summarized from the *Phase I RFI Work Plan* (CRG, 2000) and *Phase I RFI Data Summary Report* (CRG, 2003).

2.1 Facility Location and Setting

The DTI Waynesboro site is located on approximately 177 acres of flat lying land along the South River in the southeastern corner of Waynesboro, Virginia (Figure 1). DuPont began operations at the site by manufacturing acetate flake and yarn in 1929. In 1958, DuPont began producing Orlon®, the plant's second fiber. The acetate process and Orlon® process were discontinued in 1977 and 1990, respectively. In the interim, Lycra® production had begun in 1962, with Permasep® production beginning in 1969 and BCF Nylon in 1978. Lycra® and BCF Nylon fibers continue to be made today. Because of its long manufacturing history at the site, DuPont has established a strong and consistent presence in the community. Fibers manufacturing operations will continue at the site for the foreseeable future.

The site is located in an industrially zoned area. The South River bounds the plant on the northern side. Immediately adjacent to the southern boundary of the plant site is a mix of industrial facilities and residential communities. The area to the east of the plant is primarily residential and businesses, and the area to the west is residential.

Other large manufacturing facilities in the surrounding area include Wayn-Tex Inc., Allied Ready Mix Company; Genicom Corporation; McClung Co.; Polymer Group, Inc., Virginia Metalcrafters, Inc.; South River Complex; Hopeman Brothers, Inc.; and Augusta Lumber, Inc.

2.2 Site Geology and Hydrogeology

The geologic and hydrogeologic site conceptual model was revised based on observations made during the Phase I Remedial Action/RFI site investigation. The complete conceptual model for the site is presented in the RA/RFI Work Plan (CRG, 2000).

The uppermost geologic unit is recent alluvium, which includes floodplain and terrace deposits of the South River. This unit consists predominantly of fine to medium grained, silty sand and gravel as well as sandy silt and sandy clay. The thickness of this unit is typically 12 to 18 feet. The alluvial unit is absent in the southern portion of the site.

The upper alluvial sand and gravel unit unconformably overlies the bedrock residuum of the Waynesboro Formation at a shallow depth (<20 feet) across the majority of the site. This residuum, consists predominantly of very dense, clayey silt and stiff to very stiff, silty clay. The residuum also includes thin interbeds of mudstone and siltstone. Relic bedding structures have been observed in the residuum at numerous boring locations. The thickness of the residuum was found to be > 50 feet although the base of the residuum was not encountered during the Phase I RFI site investigation.

Previous investigations have shown that the thickness of the recent alluvial overburden increases significantly (66 feet at MW-10A) at the base of the Blue Ridge in the northeast portion of the site.

Two saturated zones, designated as the shallow and deep flow zones, exist at the site. The shallow flow zone occurs within the recent alluvial sand and gravel deposits, is unconfined, and occurs at depths from 3 feet below ground surface (bgs) in the center of the plant to 14 feet. bgs along the South River. The saturated thickness of this aquifer within the plant area typically varies from 3 to 11 feet. (7-foot average). The hydraulic conductivity of this aquifer averages 2.6 x 10^{-2} cm/sec. The principle direction of groundwater flow within the shallow flow zone is toward the South River (north-northwest), which is the main point of discharge for groundwater. However, in the northeastern portion of the site, groundwater in the shallow flow zone flows northeastward toward the area of deep alluvial deposits. The horizontal and vertical continuity of the shallow flow zone in this portion of the site remains uncertain.

The deep flow zone is limited to the northwestern portion of the site along the South River. The deep flow zone, which is confined or semi-confined, consists of a thin (5 to 9 feet thick) zone of saturated sandy and gravely clays within the silt and clay residuum. These units were encountered along the South River at depths of 30 to 40 feet bgs. The hydraulic conductivity of this aquifer averaged 4.1 x 10^{-4} cm/sec. Although the direction of groundwater flow within the deep flow zone is uncertain due to its limited extent at the site, the potentiometric surface elevations along the South River suggest that the flow may to the north-northeast. The point of discharge for this groundwater is unknown. No significant vertical gradient was observed between the shallow and deep flow zones adjacent to the South River.

2.3 Regional Groundwater and Surface Water Use

The City of Waynesboro is entirely dependent on groundwater from bedrock aquifers for public and private consumption. In the Waynesboro vicinity, groundwater is most often found in a complex network of bedrock fractures. The Waynesboro Valley comprises limestone and dolostone with interbeds of sandstone and shale. These rocks have been considerably folded resulting in numerous fractures and joint systems. These carbonate rocks have been subjected to solution activity to enlarge the fracture system and provide substantial secondary permeability.

The South River, located north of the site, has played a significant role in the historic development of Waynesboro. The river is viewed as an industrial and natural resource, a flood hazard, and a recreational and scenic amenity.

The South River originates in southern Augusta County near Greenville and flows north, eventually joining the North and Middle Rivers to form the South Fork of the Shenandoah River near Port Republic in Rockingham County, some 20 miles north of Waynesboro. Along its 52-mile length, the South River drains 144 square miles of watershed consisting of wooded mountainous terrain, agricultural bottom land, and increasingly urbanizing areas.

3.0 STEP 1—INFORMATION REVIEWED

Step 1 in the EI determination process asks the following question:

> *Has all available relevant/significant information on known and reasonably suspected releases… subject to RCRA Corrective Action… been considered in this EI determination?*

This section reviews applicable investigations conducted at the Waynesboro Plant. In reviewing the data, only releases from units subject to RCRA corrective action authority [e.g., solid waste management units (SWMUs) and Areas of Concern (AOCs)] were considered in this evaluation.

3.1 Summary of Investigations

The following summarizes environmental investigations to date, which form the basis of EI determination. Currently, the South River Science Team is conducting additional investigations that can be used to ensure that the EI Determination is appropriate.

- ❑ August 1980 Hydrological Investigation to Determine Groundwater Flow into the South River from the DuPont Waynesboro Virginia Plant (Leggette, Brashears, & Graham, Inc):
  - Groundwater
- ❑ 1980 Mercury Contamination of the Flood Plains of the South and South Fork Shenandoah Rivers (Virginia State Water Control Board):
  - Soil
  - Sediment
  - Surface Water
- ❑ 1998 A Comprehensive Evaluation of the South and South Fork Shenandoah Rivers for Mercury Contamination (Old Dominion University):
  - Sediment
  - Surface Water
- ❑ October 1989 Groundwater and Waste Management Unit Assessment (DuPont Engineering Services):
  - Groundwater
  - Waste Management
- ❑ June 1993 Groundwater Characterization Study, Oil Discharge Contingency Plan (Tethys Consultants Inc.):
  - Soil
  - Groundwater
- ❑ 2000-2001 Phase I RA/RFI (CRG):
  - Groundwater
  - Soil
  - Surface Water

With the exception of the Phase I RA/RFI, environmental investigations conducted at the site were not designed to address the presence or absence of releases at specific SWMUs or AOCs, or to determine the nature and extent of contamination at those units. However, the analytical data generated during these investigations were of sufficient quality to be applicable to the EI determination process.

3.2 Data Set for EI Determination

The following analytical data were used in the EI determination:

- Groundwater sampling results generated from two rounds of monitoring between August 2000 and October 2000
- Shallow soil sampling results (less than 1 foot deep) generated during the RFI activities in 2000
- Subsurface soil sampling results (within 20 feet of ground surface) generated during the Phase I RFI
- Soil, sediment, and surface water sampling results generated from the South River during a state investigation: "Mercury Contamination of the Flood Plains of the South and South Fork Shenandoah Rivers" Basic Data Bulletin 48, May 1981.
- Surface-water quality monitoring results (1999 through 2002) provided by VADEQ. (data included in Appendix A)
- Sediment sampling results from a sediment coring investigation conducted by the South River Science Team in October of 2002 in the South River and tributary stream near Dooms, Virginia (data included in Appendix B).

4.0 STEP 2—RISK-BASED SCREENING

Step 2 of the EI determination process asks the following question:

> *Are groundwater, soil, surface water, sediments, or air media known or reasonably suspected to be "contaminated" above appropriately protective risk-based "levels"...from releases subject to RCRA Corrective Action?*

This section presents the risk-based screening levels that were used for current land- and water-use at and near the Waynesboro Plant along with the media screening process.

Although groundwater is not used as a potable water supply on-site at the Waynesboro plant, as a conservative measure, groundwater data were screened against MCLs, USEPA Region III Tapwater RBCs and Virginia groundwater standard. Soil data were screened against USEPA Region III Residential and Industrial RBCs and soil screening levels (SSL) for protection of groundwater (USEPA Region III). No screening values were identified for sediments. American Conference of Government Industrial Hygienist (ACGIH) or Occupational Safety and Health Administration (OSHA) permissible exposure levels PELs were used to screen for volatile contaminants in air.

4.1 Groundwater

Constituents detected in groundwater at the Waynesboro site have been compared in the RFI Data Summary Report to MCLs, USEPA Region III Tapwater RBCs and VGS as requested by USEPA. Groundwater Constituents that exceeded the MCLs, RBCs, or VGS were retained for evaluation in the EI determination.

In summary, the RFI environmental investigation at the Waynesboro site has identified mercury as the primary contaminant of concern. In groundwater, mercury was detected exceeding the SL at each of the six areas investigated. Mercury exceeded the MCL criteria at two areas: Manufacturing Area (SWMU 1) and the Incinerator Area (SWMU 4). Other metals (11) and sulfide (three wells) have been detected exceeding the SL at a smaller number of locations but are not present as a widespread plume. 1,1-DCE exceeded the SL at one well in the deep aquifer in a localized area of the main plant.

4.1.1 Shallow Groundwater

Analytical results for detected constituents in the shallow flow zone are included in the *RFI Data Summary Report*. Dissolved metals above on-site drinking water SLs are shown below with the number of results exceeding the SL (based on 32 samples):

Antimony (1)	Mercury (5)
Barium (2)	Zinc (1)

Mercury is the chief constituent of interest in shallow groundwater at the site. The distribution of mercury in shallow groundwater is summarized as follows:

- Total mercury concentrations ranged from 0.057 J ug/L to 117 ug/L. Dissolved mercury ranged from 0.17 J ug/L to 1.1 ug/L.

- Total mercury exceeded the VGS of 0.05 ug/L in 14 of 32 samples, including some samples from wells at the property perimeter.
- Total mercury did not exceed the MCL of 2 ug/L in perimeter wells.
- Dissolved mercury exceeded the VGS of 0.05 ug/L in wells A, MW-11A, and MW-12, which are located near current or former operational areas.
- Dissolved mercury concentrations were below the VGS in perimeter wells.
- Dissolved mercury did not exceed the MCL of 2 ug/L in any sample.

A number of metals other than mercury exceeded the on-site drinking water SLs (see list above). However, these metals are not considered to be a significant concern, especially considering the dissolved-phase results, which are more representative of potential leaching from soil to groundwater. Dissolved-phase metals that exceeded SLs are localized to certain wells near current or former operational areas or appear to be naturally occurring.

4.1.2 Deep Groundwater

Three riverbank wells (MW-17D, MW-19D, and MW-20D) that are screened in the bedrock residuum, and well MW-12D, which is an intermediate depth well upgradient of the incinerator area are used to monitor the deep flow zone groundwater. The RFI results are described below.

Mercury was detected in only two samples. Total mercury was observed at 0.33 ug/L in one sample from MW-12D but was not detected in the other sample and in the filtered samples from this well. Dissolved mercury was reported at 0.12 J ug/L in one sample from MW-20D but was non-detect in other samples from this well.

1,1-DCE was detected in MW-12D. It has not been detected in soil or shallow groundwater and is not a SWMU-related constituent. Other constituents were not detected above screening criteria.

4.2 Air (Indoors)

Groundwater with VOCs occurs within 100 feet of Warehouse No. 3 near the Incinerator Area (SWMU 4). The evaluation of groundwater with respect to potential indoor air issues follows the principles in the draft USEPA Guidance (*Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils, Subsurface Vapor Intrusion Guidance, November 2002*). This guidance pertains to residential sites and specifically indicates that industrial properties are not covered but should be addressed under OSHA requirements. The guidance's recommendation on the issue was one of notification of the site such that the issue could be appropriately addressed. A recent USEPA Fact Sheet (USEPA, 2003) re-emphasizes this position

Although the subsurface vapor guidance is specific to residential sites, the general principles can be applied at industrial properties. However, the key difference (consistent with the guidance) is that OSHA applies. Hence, in this evaluation, OSHA PELs and the ACGIH threshold limit values (TLVs) were used to develop appropriate indoor air target concentrations for potential on-site exposure rather than use the residential indoor air target concentrations provided in the draft guidance. The screening levels for these constituents were developed using the USEPA methodology from the subsurface vapor guidance and OSHA PELs as well the ACGIH TLVs, using the calculations described in Appendix D of the draft guidance (USEPA, 2002). These calculations are provided in Appendix C of this report.

The maximum concentration of each VOC detected in groundwater was compared to the calculated screening levels. None of the detected concentrations exceeded their respective screening concentrations. Therefore, vapor intrusion of VOCs from groundwater to indoor air is not expected to be a potential concern.

4.3 Surface Soil

Data evaluated for this pathway included surface (less than 2 feet bgs) and subsurface (between 2 and 12 feet bgs) soil samples collected during the Phase I RA/RFI. On-site surface soil concentrations were compared to USEPA Region III RBCs for industrial direct contact with soil. Mercury exceeded this criterion at two areas (the Manufacturing Area, SWMU-1 and former Incinerator Area, SWMU-4) in the plant, and arsenic at one area (SWMU 4).

Off-site samples have been collected from the upper 2 feet for each mile along the South River watershed within the floodplain areas. Available data for South River floodplain samples, downstream of the Waynesboro site, are summarized in the Virginia State Water Control Board: *Basic Data Bulletin 48, May 1981.* Off-site floodplain sample results were compared to the RBC for residential direct contact. A review of available data indicates 6 samples (of 35) collected at three locations exceeded the residential RBC of 23 mg/kg. Off-site soils were identified for further evaluation based on mercury.

4.4 Surface Water

Analytical results for surface-water samples from the South River were compared to the Virginia water quality standard and/or the National Recommended Water Quality Criteria. A summary table of the surface water quality monitoring results available from the VADEQ (1999 through 2002) is in Appendix A. Analytical results for mercury (the key contaminant) do not exceed the surface-water screening criteria. Mercury has not been found in surface-water samples above water quality criteria. Even though no apparent impact to surface water is present (current conditions), evaluation of surface water will be retained through subsequent steps of the EI to address the "food" pathway due to elevated mercury levels in fish tissues.

4.5 Sediment

Sediment samples have been collected and analyzed by the South River Science Team. A summary table of mercury results in sediment is in Appendix B. Some elevated concentrations of mercury (greater than 200 mg/kg) were detected in core samples at sediment depth of 1 foot to 3 feet below the streambed (one location). USEPA has not developed human health risk-based levels for sediments, and none are proposed here.

The key contaminant is mercury, and the most likely exposure route is dermal. RAGS Part E advises against developing dermal criteria for metals other than arsenic and cadmium for soil contact. Additionally, there are limited sediments in the South River (the river bottom is primarily rocky). Although there are no "contaminated" sediments based on comparison to a screening level, evaluation of the sediments will be retained through subsequent steps of the EI due to the minor occurrence of elevated mercury.

4.6 Subsurface Soil

Environmental investigations at the Waynesboro site have identified mercury as the primary contaminant. Mercury was detected in the subsurface soil, exceeding the SL at the former incinerator area (SWMU 4). Other subsurface soil contaminants there include 1,2,3,7,8-PECDD, 2,3,4,7,8-PECDF, HXCDDS (total), and arsenic. Arsenic was also detected exceeding the SL at the ash disposal area (SWMU 2). Previous excavation work at the Mercury Recovery Area (SWMU 1) have indicated the presence of free mercury in soil; as such, subsurface soil will be retained for evaluation.

4.7 Air (Outdoors)

Emissions to outdoor air typically results from direct emission of volatiles from impacted soil and emission of particulates containing non-volatiles. At the site, emission of impacted surface soil particulates is not a mechanism of concern because impacted surface soil areas are:

- Not subjected to vehicular traffic that would otherwise encourage dust generation
- Have coverings such as vegetation, gravel, asphalt, or concrete
- Not coincident with areas where Waynesboro employees reside for extended periods of time
- Combinations of the above

Considering the previous results of the assessment of indoor air (i.e., no impact above standards), volatile emissions to outdoor air also would not cause concentrations above standards because outdoor air involves substantially greater mixing and dilution with ambient air.

5.0 STEP 3—COMPLETE EXPOSURE PATHWAYS

Step 3 of the EI determination process asks the following question:

> *Are there complete pathways between "contamination" and human receptors such that exposures can be reasonably expected under current (land- and groundwater-use) conditions?*

This section presents the potentially exposed receptors for the current land- and water-uses and complete exposure pathways for each receptor.

A preliminary conceptual site model (CSM) is presented in detail in Section 2.4 of the *RFI Work Plan* (CRG, 2000), and exposure pathway evaluations are summarized in the *RA / RFI Data Summary Report* (CRG 2003). The evaluations provide integrated representation of pertinent information currently available for the Waynesboro Plant and were developed to compare the relative potential for a unit (SWMU or AOC), or group of units, to pose a threat to human health and the environment. The CSM was based on an integrated analysis of potential exposure pathways, hazardous substance release constituent concentrations, environmental fate and transport mechanisms, and risk to human health and the environment.

The CSM addresses four primary elements: identification and characterization of potential and former source areas; preliminary identification of constituents of concern; definition of primary transport mechanisms; and identification of potential receptors and exposure points. The potential receptors and exposure points are the focus of Step 3.

5.1 Identification of Potential Receptors and Exposure Points

The EI evaluation identifies exposure pathways by which human receptors may be exposed to constituents in environmental media under current land- and water-use conditions. An exposure pathway consists of the following:

- ❑ Source of constituents
- ❑ Mechanism of constituent release to the environment
- ❑ Transport or exposure medium containing the constituents
- ❑ Exposure point where humans (receptors) can contact the exposure medium
- ❑ Exposure route (e.g., inhalation or ingestion)

All of these elements must be present for an exposure to occur. The potential exposure pathways for each receptor category are described below.

5.1.1 Potential Receptors

Potential receptors are defined as human populations or individuals that are susceptible to contaminant exposure from the site. As part of the EI determination process, only currently known land- and water-use conditions were considered in determining exposure scenarios.

The Waynesboro Plant is an active industrial facility. There are some areas of exposed surface soil and three surface-water bodies at the edges of the site (Baker Spring, South River, and Rockfish Run). Therefore, on-site industrial workers are potential receptors. Excavation and utility work, where soils are excavated to depth, does take place at the plant and will continue. Therefore, excavation/utility workers are potential receptors. The site work policy includes a work permit and excavation permit procedure that includes an environmental-safety evaluation and approvals. Although limited, workers are considered potential receptors.

The South River extends approximately 24 miles downstream of the Waynesboro site with residential and agriculture land use along the riverbanks and within the floodplain.

There are no day care facilities at the site. A recent database search (Virginia Department of Social Services) of licensed child-care centers was conducted for Waynesboro and the downstream communities along the South River. None of the licensed child-care facilities were located on South River floodplain land. Therefore, this receptor is currently not applicable.

Most of the site's SWMUs are fenced and guarded, and access is controlled and limited to authorized personnel only. Therefore, in these areas, a trespasser was not considered a potential receptor. SWMU 2 and SWMU 11 (Ash Ponds and Lime Ponds) are located outside the fenced portion of the site. Trespassers do have access to SWMU 2 and SWMU 11. The area of SWMU 2 is covered with gravel and concrete, and the likelihood of direct contact to impacted media is considered negligible. Therefore, trespassers are not considered a potential receptor to SWMU 2. SWMU 11 is not carried into the pathway evaluation (not contaminated as defined in Step 2).

Recreational users of the South River do exist at the area near the site and downstream. Land access to the stream banks on the Waynesboro Plant is limited due to site security, fencing, and the presence of vegetation. To the extent that recreators may use the area, such use predominantly occurs during warm weather months. Recreational users of the river are considered potential receptors. Fishing is likely to occur in the South River, and those that consume fish (food) are considered potential receptors.

Groundwater is not used for domestic water supply in the residential areas located around the facility. Groundwater is not used for drinking water supply at the plant nor in the residential properties surrounding the plant. Therefore, the on-site workers and off-site residents were not considered potential receptors of groundwater.

5.1.2 Potential Exposure Pathways by Receptor

A description of the exposure pathways for each of the potential receptors is provided below.

On-Site Industrial Worker

The industrial worker is potentially exposed to constituents in surface soil (0 to 2 foot bgs). Potential exposure pathways include incidental ingestion of and dermal contact with surface soil and inhalation of surface soil-derived particulates and vapors.

On-Site Construction Worker

The on-site excavation/utility worker (construction) is potentially exposed to constituents in all environmental media during the repair of subsurface utility lines. Subsurface soil depths for direct contact exposures by this receptor are defined as 2 to 12 feet bgs, based on past activity at the site and location of utilities on-site. Groundwater occurs at depths ranging from 3 to 14 feet bgs at the site. Direct contact with groundwater may also occur during intrusive activities in the active manufacturing area. Potential exposure pathways include incidental ingestion and dermal contact with soils, inhalation of soil-derived particulates and vapors, incidental ingestion of and dermal contact with groundwater or surface water, and inhalation of vapor phase chemicals released from groundwater to confined space (trench) or outdoor air.

Off-Site Residents

Off-site residents are present in areas of the South River floodplain downstream of the site. Potential exposure pathways include incidental ingestion and dermal contact with floodplain soils and inhalation of soil-derived particulates and vapors.

Off-Site Recreational User

The off-site recreational user of the South River is potentially exposed to constituents in surficial floodplain soils, surface water, and/or impacted fish. Potential exposure pathways include incidental ingestion and dermal contact with soil, ingestion of fish (food), and inhalation of soil-derived particulates.

5.1.3 Complete Exposure Pathways by Media

Consistent with the EI determination process, potentially complete exposure pathways identified in Section 5.1.2 were further evaluated to determine if exposures can be reasonably expected to occur under current conditions at the site. The rationale for identifying pathways as incomplete is described in Section 5.1.4.

Soil

The potential exists for direct contact with impacted surface soil during industrial work activities in the fenced main operating portion of the site. The potential also exists for direct contact with impacted subsurface soil during excavation/utility activities.

Potentially complete exposure pathways include the following:

- On-site worker: incidental ingestion of, direct contact with, and inhalation of particulates from surface soil
- On-site excavation/utility worker: incidental ingestion of, direct contact with, and inhalation of particulates from surface and subsurface soil
- Off-site residents and/or recreational users: direct contact with and inhalation of particulates from surface soil

Groundwater

The potential for exposure is low because shallow groundwater is not used on-site for potable or industrial purposes. No off-site use of groundwater from impacted aquifers has been identified near the site. However, due to the shallow depth of groundwater in some portions of the Plant Area, exposure may occur during excavation/utility activities. The complete potential exposure pathway for the on-site excavation/utility worker includes incidental ingestion and dermal contact with groundwater.

Surface Water

Recreational use of the South River (boating, fishing) at impacted areas is possible, resulting in potential exposure via "food."

5.1.4 Incomplete Pathways

Mitigating factors were used in the evaluation of the completeness of an exposure pathway. The evaluation of mitigating factors uses logical and scientifically defensible reasoning based on a broader, more site-specific understanding of the CSM to predict more accurately the potential effects of evaluated releases.

Mitigating factors may include caps and covers that minimize the potential for direct contact, groundwater-use restrictions, institutional controls established to minimize worker exposure and potential trespassers, or waste management records identifying the types of wastes handled at a unit.

Application of mitigating factors is consistent with the approach used in EI determinations. Current human exposures are considered to be controlled if there is not a complete exposure pathway.

Soil

Because the day-to-day operations of the on-site industrial worker do not include intrusive activities, direct contact (ingestion or dermal contact) with subsurface soil is not anticipated and is incomplete. Likewise, if surface soil contamination exists in an area of the site, which is not routinely accessible to on-site industrial workers due to institutional or physical controls (e.g., locked areas or asphalt/concrete caps), then exposure pathways in those areas are incomplete as well. For instance, within the active manufacturing area, the presence of either asphalt or backfill limits the potential for exposure.

Mercury is not expected to accumulate in food crops at the levels present in floodplain soils (USEPA Biosolids Rule, 1995; NAS, 1996; EPA, 1997; DOE, 1998). Exposure pathways associated with food from soil are incomplete. There is a current Science Team study to confirm this conclusion on a site-specific basis.

Groundwater

Shallow groundwater is not used on-site for potable or industrial uses. Therefore, direct contact (ingestion or dermal contact) with groundwater for on-site industrial workers is incomplete. Potential exists for groundwater to discharge into the South River. However, due to the effect of mixing zone dilution into the river and solute transport effects, overall exposure to this discharge is insignificant. In addition, no significant receptors for the stream have been identified.

Sediment

Elevated concentrations of mercury in sediment (greater than 200 mg/kg) were detected at one sampling location. Although there is not a screening criteria applied to the sediment data, these sediments may be considered "impacted." The depth of the samples were in a core greater than12 inches below the streambed in a localized area of river where fine-grained sediments have accumulated. Due to their depth, these impacted sediments are very inaccessible to users of the South River. In addition, fine-grained sediments are absent from the stream bed throughout most of the South River down-stream of the Waynesboro plant. Therefore, the potential for exposure via contact is considered negligible.

6.0 STEP 4—EXPOSURE ANALYSIS

The screening process used in Steps 2 and 3 may yield an incomplete picture that over- or underestimates the conditions associated with that unit for posing a potential adverse effect on human health. As a result, Step 4 of the EI determination process asks the following question:

> *Can the exposures from any of the complete pathways identified in Step 3 be reasonably expected to be "significant"?*

This section considers the unit- or site-specific activity patterns and physical conditions that exist at the site or unit and focuses on whether potential exposure pathways and receptors can be reasonably expected to be significant.

6.1 Summary of Exposure Analysis

The following complete exposure pathways were evaluated in Step 4 of the EI determination process.

6.1.1 Surface Soil (e.g., <2 feet)

At the Waynesboro plant only mercury and arsenic were detected in surface soil above screening criteria. All areas of impacted surface soil have ground covers that minimize worker and construction exposure to the impacted surface soil. Ground covers include vegetation (i.e., grass), gravel, asphalt, and concrete. Waynesboro plant policy and land-use controls prohibit worker disturbance of impacted surface soil areas without appropriate health and safety measures that control exposure. Accordingly, incidental worker or construction exposure to impacted surface soil is considered insignificant.

Surface soils (off-site) were sampled each mile along the South River watershed within the floodplain areas. Available data for South River floodplain samples, downstream of the Waynesboro facility, are summarized in Appendix A (Virginia State Water Control Board, 1981). RBCs for direct contact in a residential setting were used in the data review. A review of available data indicates 6 samples (of 35) from three locations exceeded the residential RBC of 23 mg/kg. These samples were collected from the upper 2 feet depth interval and are retained for the surface soil evaluation.

Core samples were collected from two depth zones in the floodplain soil in the summer of 1980. Near surface soil (0 to 6 inches) were collected at 25 locations along the river floodplain downstream of the Waynesboro facility. Deeper core samples (12 to 16 inches) were obtained from ten selected locations along the downstream floodplain. The samples collected near-surface (0 to 6 inches) represent soil that is available for potential direct contact in residential settings. The mercury RBC for residential direct contact (23 mg/kg) is based on very conservative assumptions for toxicity and exposure. The RBC was exceeded at 3 of 25 locations in soil samples with concentrations ranging from 23 to 37 mg/kg. The average concentration in near-surface soil is well below the RBC as represented by 50 sample results (two samples at each location). Based on the limited exceeded results, relatively low levels of mercury detected in these exceeded samples, and the average soil concentration below RBCs, the near-surface soil exposure potential is considered insignificant.

The core samples collected from the floodplain at deeper depths of 12 to 16 inches do not represent the same potential exposure for residential direct contact to surface soil. Three of ten locations (river mile 1, 3, and 7) resulted with samples exceeding the residential mercury RBC. Sample results at seven other locations (12 to 16 inch sample depth) were well below the residential RBC. Residential and recreational land use provides very limited exposure to soil at depths of 12 inches or greater. The incidental exposure potential to deeper soil (below 12 inches) and overall low concentrations that are likely present make the exposure to impacted deeper (surface) soil insignificant for workers, residents, and recreational users.

6.1.2 Subsurface soil (e.g., >2 feet)

All plant areas of impacted subsurface soil have ground covers that minimize construction worker exposure to the impacted subsurface soil. Ground covers include vegetation (i.e., grass), gravel, asphalt and concrete. The Waynesboro plant policy and land-use controls prohibit worker and construction disturbance of impacted subsurface soil areas without appropriate health and safety measures that control exposure. Accordingly, although incidental exposure is possible, most exposures are considered insignificant.

Reports from previous excavation work at the Mercury Recovery Area (SWMU 1) have indicated the presence of free mercury in soil. Free mercury was also identified in sub-surface soils in the Incineration Area (SWMU 4). The potential presence of mercury in soil at these areas could present an exposure potential.

As such, the Waynesboro facility has utilized a permitting process that requires Waynesboro Environmental Affairs authorization for any intrusive activities (boring, drilling, excavation, etc.) into the soils or building foundations at the facility. The purpose of the permitting process is to ensure the following:

- Appropriate measures are taken for personnel protection should such subsurface activity encounter contaminated soils, groundwater, or vapors, particularly associated with mercury contamination.
- Construction methods are conducive to protection of the groundwater from contamination or transfer of contaminants laterally or vertically.
- Construction practices are carried out so as to minimize the generation of potentially contaminated media and to ensure that such media are properly characterized and disposed of in accordance with regulatory requirements.

The plant's industrial hygienist and site environmental support personnel work as a team to prepare recommendations on appropriate personnel protective equipment (PPE). Depending on the location of the excavation, air monitoring is performed prior any work being performed and may continue during excavation. Air space monitoring for mercury vapors is required for intrusive work at the Mercury Recovery Area (SWMU 1) and the Incineration Area (SWMU 4). This enables the use of the appropriate breathing equipment if mercury vapors are present at levels above the established worker threshold.

Also, workers who engage in intrusive activities in contaminated areas are required to be OSHA 1910.120 trained.

Due to the strict adherence to the intrusive activity permitting process that is required at the Waynesboro facility, the potential exposure of on-site construction workers to potentially contaminated soil is not significant.

6.1.3 Surface Water

Surface water was retained in the evaluation to address the potential pathway via "food." An advisory for fish consumption and a catch and release program are in effect for the South River. The voluntary catch and release program has been verified to be effective by the results of a regional creel study (Bowman, 1997). The potential for exposure via the food pathway is considered negligible.

6.1.4 Groundwater

The on-site excavation/utility worker is potentially exposed to constituents in groundwater during the repair of subsurface utility lines. Groundwater occurs at depths ranging from 3 to 14 feet bgs at the site. The complete exposure pathway for the on-site excavation/utility worker includes incidental ingestion and dermal contact with groundwater. Concentrations of site constituents in groundwater are generally low with only inorganic compounds exceeding the drinking water screening criteria (see Section 4.1). The Waynesboro plant policy prohibit worker and construction disturbance of the subsurface (and groundwater) without appropriate health and safety measures that control exposure. Accordingly, although incidental exposure is possible, such exposures are considered insignificant.

7.0 STEP 5—RISK CHARACTERIZATION

Step 5 of the EI determination process quantitatively evaluates the specifics of reasonably anticipated exposures exceeding screening levels. Specifically,

> *Can the "significant" exposures (identified in Step 4) be shown to be within acceptable limits?*

As discussed in Section 6.0, no potential exposure pathways for human receptors under current conditions are significant. As a result, Step 5 of the EI determination process was not completed. The conclusion of the EI determination is presented in Section 8.0, which contains Step 6, the final step of the EI determination process.

8.0 STEP 6—EI DETERMINATION

The evaluation completed in Steps 1 through 5 of the EI determination process results in one of three potential responses:

- "YE" (yes, "current human exposures under control" has been verified)
- "NO" ("current human exposures" are not "under control")
- "IN" (more information is needed to make a determination)

A positive CA-725 EI determination **(YE)** was achieved for the Waynesboro site as summarized in the USEPA scoresheet included in the Executive Summary of this report. A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "significant" human exposures to "contamination" that can be reasonably expected under current land- and groundwater-use [for all "contamination" subject to RCRA corrective action at or from the identified site (i.e., site-wide)] (USEPA, 1999).

9.0 REFERENCES

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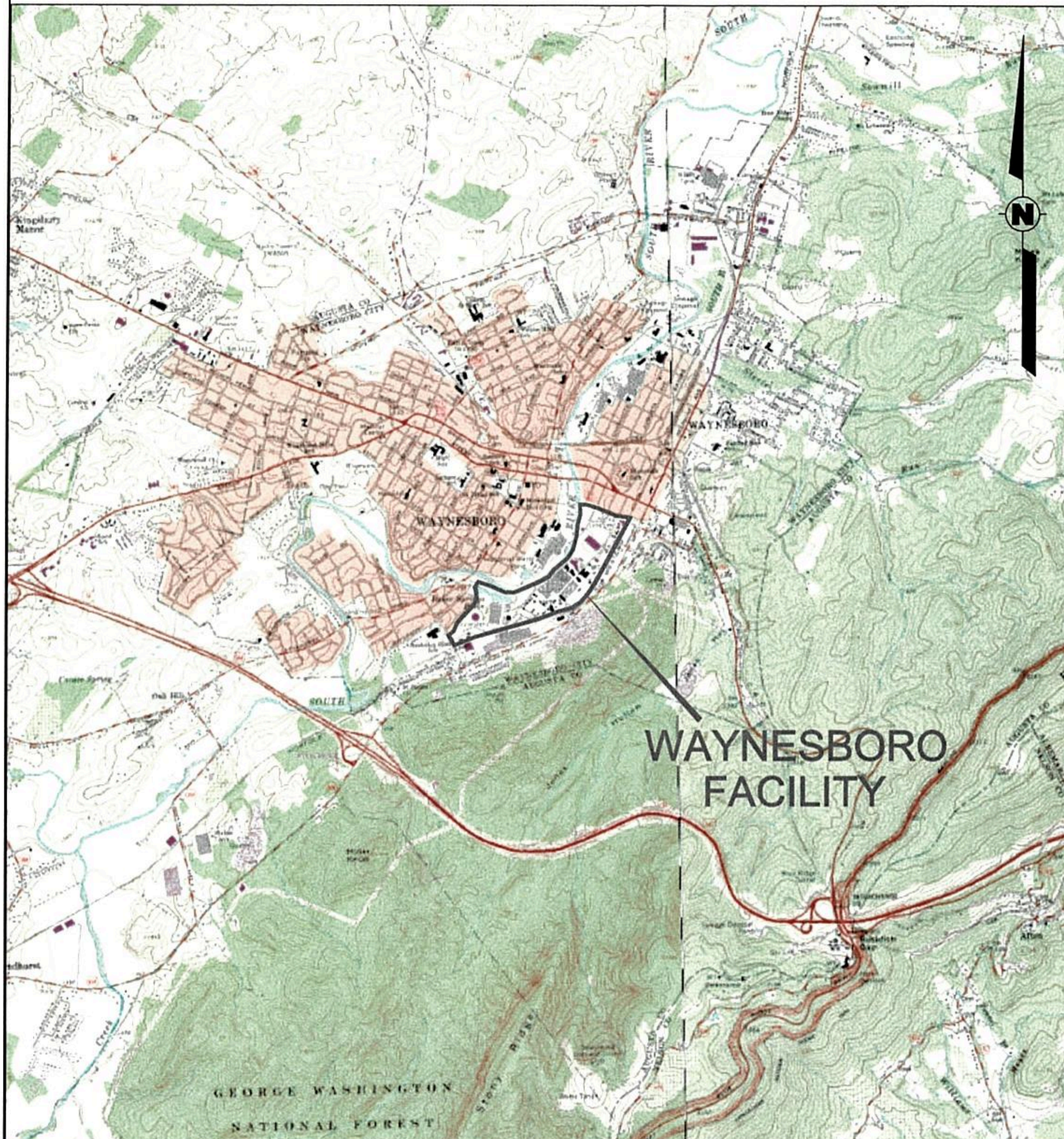
FIGURES



SCALE

4000 0 4000'

THIS MAP WAS TAKEN FROM THE WAYNESBORO WEST VIRGINIA USGS QUADRANGLE MAP ON TOPOZONE.COM

DUPONT

Corporate Remediation Group

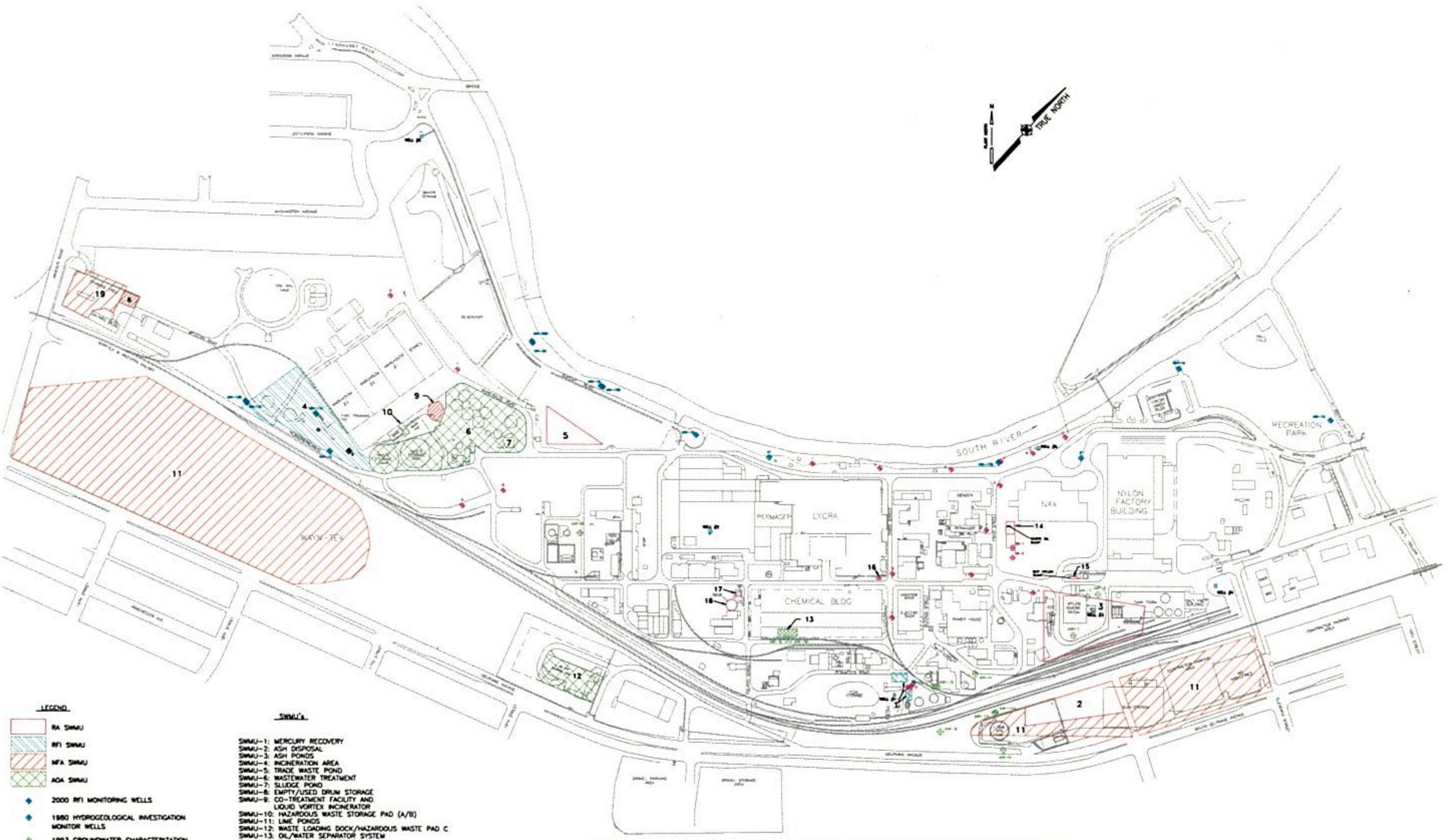
An Alliance between DuPont and URS Diamond

Barley Mill Plaza, Building 27
Wilmington, Delaware 19805

SITE LOCATION MAP

DuPont Waynesboro Facility
Waynesboro, virginia

SCALE	DESIGNED	DRAWN	CAD FILE NO.
As Shown		DEL	3834A001
DATE	CHECKED	APPROVED	FIGURE
8/27/03	MPS		1



LEGEND

- RA SWMU
- RFI SWMU
- NFA SWMU
- AOA SWMU
- 2000 RFI MONITORING WELLS
- 1980 HYDROGEOLOGICAL INVESTIGATION MONITOR WELLS
- 1993 GROUNDWATER CHARACTERIZATION STUDY WELLS
- 1994 UST INVESTIGATION MONITORING WELLS
- PRE-1980 MONITOR WELLS
- PRODUCTION WELLS

SWMU's

SWMU-1: MERCURY RECOVERY
SWMU-2: ASH DISPOSAL
SWMU-3: ASH PONDS
SWMU-4: INCINERATION AREA
SWMU-5: TRADE WASTE POND
SWMU-6: WASTEWATER TREATMENT
SWMU-7: SLUDGE POND
SWMU-8: EMPTY/USED DRUM STORAGE
SWMU-9: CO-TREATMENT FACILITY AND LIQUID VORTEX INCINERATOR
SWMU-10: HAZARDOUS WASTE STORAGE PAD (A/B)
SWMU-11: LIME PONDS
SWMU-12: WASTE LOADING DOCK/HAZARDOUS WASTE PAD C
SWMU-13: OIL/WATER SEPARATOR SYSTEM
SWMU-14: PLANT MAINTENANCE SUMP
SWMU-15: BCF NYLON SUMP
SWMU-16: LYCRA SUMP
SWMU-17: ORLON SUMP
SWMU-18: ACETATION WASTE TANK
SWMU-19: SALVAGE YARD
SWMU-20: PROCESS SEWER LINES (NOT SHOWN)

NO.	REVISIONS	BY	DATE

DESIGNED	INITIALS
MPS	
DRAWN	
DEL	
CHECKED	
APPROVED(DESIGN)	
APPROVED(CONSTRUCTION)	

DUPONT

Corporate Remediation Group

An Alliance between DuPont and The F-C Diamond Group

Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

SWMU AND WELL LOCATION MAP

DuPont Waynesboro Plant
Waynesboro, Virginia

SCALE	DATE	DRAWING NO.	FIGURE
1"=200'	6/27/03	38340001.DWG	2

APPENDICES

APPENDIX A

OFFSITE SURFACE WATER SAMPLING RESULTS, VADEQ

Appendix A
Dissolved Mercury Concentration in Offsite Surface Water (South River)
DTI Waynesboro Plant

Sample Station Identification	Collection Date	Mercury Concentration (ug/l)
1BSTH007.80	08/23/00	0.0075
1BSTH007.80	08/23/00	0.00749
1BSTH007.80	10/17/00	0.00704
1BSTH007.80	10/17/00	0.0071
1BSTH007.80	12/05/00	0.005484
1BSTH007.80	12/05/00	ND
1BSTH007.80	02/27/01	0.007397
1BSTH007.80	02/27/01	0.007397
1BSTH007.80	04/10/01	0.00667
1BSTH007.80	06/25/01	0.008542
1BSTH007.80	08/21/01	0.00613
1BSTH007.80	10/25/01	0.0056
1BSTH019.26	01/08/02	0.00306
1BSTH007.80	01/08/02	0.00517
1BSTH019.26	03/20/02	0.0031
1BSTH007.80	03/20/02	0.00747
1BSTH014.49	06/18/02	0.00854
1BSTH007.80	06/18/02	0.00713
1BSTH002.14	06/18/02	0.00657
1BSTH019.26	08/05/02	0.00609
1BSTH007.80	08/05/02	0.00557
1BSTH019.26	10/22/02	0.00483
1BSTH007.80	10/22/02	0.00467
1BSTH019.26	12/18/02	0.00392
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1BSTH019.26	02/19/03	0.00555
1BSTH019.26	02/19/03	0.00278
1BSTH007.80	02/19/03	0.00283
1BSTH007.80	02/19/03	0.00717
1BSTH021.99	07/30/02	0.00342
1BSTH022.09	07/30/02	0.00317
1BSTH022.19	07/30/02	0.0025
1BSTH022.29	07/30/02	0.00252
1BSTH022.39	07/30/02	0.00204
1BSTH022.49	07/30/02	0.00264
1BSTH022.59	07/30/02	0.00291
1BSTH022.69	07/30/02	0.00285
1BSTH022.79	07/30/02	0.00287
1BSTH022.89	07/30/02	0.00326
1BSTH022.99	07/30/02	0.00333
1BSTH023.09	07/30/02	0.00467
1BSTH023.19	07/30/02	0.00246
1BSTH023.29	07/30/02	0.00232
1BSTH023.39	07/30/02	0.00258
1BSTH023.49	07/30/02	0.00236
1BSTH023.59	07/30/02	0.00336

Appendix A
Dissolved Mercury Concentration in Offsite Surface Water (South River)
DTI Waynesboro Plant

Sample Station Identification	Collection Date	Mercury Concentration (ug/l)
1BSTH021.99	07/30/02	0.00325
1BSTH022.09	07/30/02	0.00309
1BSTH022.19	07/30/02	0.00294
1BSTH022.29	07/30/02	0.00257
1BSTH022.39	07/30/02	0.00265
1BSTH022.49	07/30/02	0.00328
1BSTH022.59	07/30/02	0.00317
1BSTH022.69	07/30/02	0.00287
1BSTH022.79	07/30/02	0.0028
1BSTH022.89	07/30/02	0.00253
1BSTH022.99	07/30/02	0.00302
1BSTH023.09	07/30/02	0.00298
1BSTH023.19	07/30/02	0.00215
1BSTH023.29	07/30/02	0.00201
1BSTH023.39	07/30/02	0.00228
1BSTH023.49	07/30/02	0.0026
1BSTH023.59	07/30/02	0.00277
1BSTH022.09	08/15/02	0.00447
1BSTH022.09	08/29/02	0.00576
1BSTH023.09	08/29/02	0.00508
1BSTH023.09	08/29/02	0.00502
1BSTH023.09	08/29/02	0.00467
1BSTH023.29	08/29/02	0.00392
1BSTH029.45	03/11/03	ND
1BSTH014.49	06/18/02	0.0084
1BSTH002.14	06/18/02	0.00643
1BSTH021.99	07/30/02	0.00294
1BSTH022.29	07/30/02	0.00307
1BSTH022.39	07/30/02	0.00285
1BSTH026.73	11/14/01	ND
1BSTH024.96	11/14/01	ND
1BSTH024.97	11/14/01	0.0016
1BSTH025.83	11/14/01	ND
1BSTH023.73	11/14/01	0.0017
1BSTH022.19	11/14/01	0.00375
1BSTH019.52	11/14/01	0.0048
1BSTH026.73	01/09/02	ND
1BSTH025.83	01/09/02	ND
1BSTH024.97	01/09/02	ND
1BSTH024.96	01/09/02	ND
1BSTH023.73	01/09/02	ND
1BSTH022.19	01/09/02	0.00249
1BSTH026.73	03/21/02	ND

Appendix A
Dissolved Mercury Concentration in Offsite Surface Water (South River)
DTI Waynesboro Plant

Sample Station Identification	Collection Date	Mercury Concentration (ug/l)
1BSTH025.83	03/21/02	ND
1BSTH024.96	03/21/02	0.00187
1BSTH024.97	03/21/02	0.00161
1BSTH023.73	03/21/02	ND
1BSTH022.19	03/21/02	0.00242
1BSTH026.73	06/17/02	ND
1BSTH025.83	06/17/02	ND
1BSTH024.96	06/17/02	0.00194
1BSTH024.97	06/17/02	0.00315
1BSTH023.73	06/17/02	0.00204
1BSTH022.19	06/17/02	0.00414
1BSTH019.26	06/17/02	0.00651
1BSTH025.83	08/06/02	ND
1BSTH026.73	08/06/02	ND
1BSTH024.96	08/06/02	0.0034
1BSTH024.97	08/06/02	0.00261
1BSTH022.19	08/06/02	0.00348
1BSTH026.73	10/21/02	0.00175
1BSTH025.83	10/21/02	ND
1BSTH024.96	10/21/02	0.00277
1BSTH024.97	10/21/02	0.00308
1BSTH023.73	10/21/02	0.00284
1BSTH022.19	10/21/02	0.00446
1BSTH026.73	12/19/02	ND
1BSTH025.83	12/19/02	ND
1BSTH024.96	12/19/02	0.00338
1BSTH024.97	12/19/02	0.00159
1BSTH022.19	12/19/02	0.00248
1BSTH023.73	12/19/02	0.00364
1BSTH026.73	02/20/03	ND
1BSTH025.83	02/20/03	ND
1BSTH024.96	02/20/03	0.00361
1BSTH024.97	02/20/03	0.00448
1BSTH023.73	02/20/03	0.00458
1BSTH022.19	02/20/03	0.00571
South River at USGS 4.5 km upstream	6/9/1995	0.31
South River at Waynesboro Hopeman Parkway 3.6 km down	7/13/1993 5/19/1994 6/9/1995	5.54 1.91 2.17
South River at Crimora 13.1 km down	7/13/1993 10/5/1992 6/9/1995	9.15 6.06 12.20

All Mercury concentrations from filtered samples (Dissolved Mercury)
South River Data Downstream of DTI Waynesboro Plant

APPENDIX B

OFFSITE SEDIMENT SAMPLING RESULTS, SOUTH RIVER SCIENCE TEAM

Appendix B
South River Sediment Sample Results (Mercury)
DTI Waynesboro Plant

Collection Date	River Mile	Sediment Sample Depth		Mercury Concentration (mg/kg)
4/21/1977	0	0-1"	in.	3.89
4/21/1977	0	1-2"	in.	2.84
4/21/1977	0	2-3"	in.	3.41
4/20/1977	1.65	0-1"	in.	5.41
4/20/1977	1.65	1-2"	in.	2.44
4/20/1977	5.43	0-1"	in.	18.73
4/20/1977	5.43	1-2"	in.	20.77
4/20/1977	5.43	2-3"	in.	27.8
4/20/1977	10.5	0-1"	in.	48
4/20/1977	10.5	1-2"	in.	40
4/20/1977	10.5	2-3"	in.	46
4/21/1977	20.67	0-1"	in.	1.63
4/21/1977	20.67	1-2"	in.	8.55
4/21/1977	20.67	2-3"	in.	10
5/2/1978	0	0-3"	in.	7.64
5/2/1978	0	0-3"	in.	5.12
5/3/1978	1.65	0-3"	in.	12.4
5/3/1978	1.65	0-3"	in.	10.7
5/3/1978	5.43	0-3"	in.	2.57
5/3/1978	5.43	0-3"	in.	4.45
5/3/1978	10.5	0-3"	in.	15.3
5/3/1978	10.5	0-3"	in.	20
5/4/1978	20.67	0-3"	in.	9.26
5/4/1978	20.67	0-3"	in.	3.14
6/12/1979	0	0-3"	in.	2.5
6/12/1979	0	0-3"	in.	30.8
6/12/1979	1.65	0-3"	in.	1.9
6/12/1979	1.65	0-3"	in.	1.1
6/12/1979	5.43	0-3"	in.	5.5
6/12/1979	5.43	0-3"	in.	7
6/12/1979	10.5	0-3"	in.	38.9
6/12/1979	10.5	0-3"	in.	15.1
6/13/1979	20.67	0-3"	in.	7.8
6/13/1979	20.67	0-3"	in.	1
6/2/1980	0	0-3"	in.	36.5
6/2/1980	0	0-3"	in.	5.89
6/2/1980	1.65	0-3"	in.	0.76
6/2/1980	1.65	0-3"	in.	0.88
6/2/1980	5.43	0-3"	in.	13.56
6/2/1980	5.43	0-3"	in.	10.14
6/17/1980	10.5	0-3"	in.	4
6/17/1980	10.5	0-3"	in.	4.71
6/5/1980	20.67	0-3"	in.	6.08
6/5/1980	20.67	0-3"	in.	116
6/1/1981	0	0-3"	in.	137

Appendix B
South River Sediment Sample Results (Mercury)
DTI Waynesboro Plant

Collection Date	River Mile	Sediment Sample Depth		Mercury Concentration (mg/kg)
6/1/1981	0	0-3"	in.	105
6/2/1981	1.65	0-3"	in.	3.39
6/2/1981	1.65	0-3"	in.	5.38
6/2/1981	5.43	0-3"	in.	4.77
6/2/1981	5.43	0-3"	in.	4.87
6/2/1981	10.5	0-3"	in.	4.47
6/2/1981	10.5	0-3"	in.	6.63
6/2/1981	20.67	0-3"	in.	143
6/2/1981	20.67	0-3"	in.	219
6/1/1987	0	0-3"	in.	0.25
6/1/1987	0	0-3"	in.	0.6
6/1/1987	1	0-3"	in.	0.25
6/1/1987	1	0-3"	in.	0.25
6/1/1987	2	0-3"	in.	0.25
6/1/1987	2	0-3"	in.	2.13
6/1/1987	3	0-3"	in.	3.23
6/1/1987	3	0-3"	in.	14.3
6/1/1987	4	0-3"	in.	4.8
6/1/1987	4	0-3"	in.	0.25
6/1/1987	5	0-3"	in.	0.25
6/1/1987	5	0-3"	in.	5.48
6/1/1987	6	0-3"	in.	0.25
6/1/1987	6	0-3"	in.	1.83
6/1/1987	7	0-3"	in.	1.3
6/1/1987	7	0-3"	in.	0.25
6/1/1987	8	0-3"	in.	0.38
6/1/1987	8	0-3"	in.	7.23
6/1/1987	9	0-3"	in.	9.41
6/1/1987	9	0-3"	in.	0.25
6/1/1987	10	0-3"	in.	0.25
6/1/1987	10	0-3"	in.	3.23
6/1/1987	11	0-3"	in.	8.33
6/1/1987	11	0-3"	in.	1.1
6/1/1987	12	0-3"	in.	5.15
6/1/1987	12	0-3"	in.	1.25
6/1/1987	13	0-3"	in.	8.88
6/1/1987	13	0-3"	in.	0.76
6/1/1987	14	0-3"	in.	0.25
6/1/1987	14	0-3"	in.	1.93
6/1/1987	15	0-3"	in.	0.25
6/1/1987	15	0-3"	in.	0.25
6/1/1987	16	0-3"	in.	0.25
6/1/1987	16	0-3"	in.	1.7
6/1/1987	17	0-3"	in.	0.25
6/1/1987	17	0-3"	in.	4.83
6/1/1987	18	0-3"	in.	0.25
6/1/1987	18	0-3"	in.	0.25

Appendix B
South River Sediment Sample Results (Mercury)
DTI Waynesboro Plant

Collection Date	River Mile	Sediment Sample Depth		Mercury Concentration (mg/kg)
6/1/1987	19	0-3"	in.	3.35
6/1/1987	19	0-3"	in.	0.25
6/1/1987	20	0-3"	in.	0.25
6/1/1987	20	0-3"	in.	6.35
6/1/1987	21	0-3"	in.	5.5
6/1/1987	21	0-3"	in.	0.25
6/1/1987	22	0-3"	in.	6.3
6/1/1987	22	0-3"	in.	5.68
6/1/1987	23	0-3"	in.	0.91
6/1/1987	23	0-3"	in.	1.04
6/1/1987	24	0-3"	in.	1.55
6/1/1987	24	0-3"	in.	0.25
6/1/1987	25	0-3"	in.	0.88
6/1/1987	25	0-3"	in.	0.25
5/13/1997	0	0-3"	in.	2.52
5/13/1997	0	0-3"	in.	1.69
5/13/1997	1	0-3"	in.	11.60
5/13/1997	1	0-3"	in.	4.56
5/13/1997	2	0-3"	in.	0.72
5/13/1997	2	0-3"	in.	3.53
5/13/1997	3	0-3"	in.	5.27
5/13/1997	3	0-3"	in.	147.00
5/13/1997	4	0-3"	in.	2.62
5/13/1997	4	0-3"	in.	10.40
5/13/1997	5	0-3"	in.	8.48
5/13/1997	5	0-3"	in.	10.80
5/13/1997	6	0-3"	in.	2.93
5/13/1997	6	0-3"	in.	8.07
5/13/1997	7	0-3"	in.	6.13
5/13/1997	7	0-3"	in.	7.33
5/13/1997	8	0-3"	in.	10.30
5/13/1997	8	0-3"	in.	8.06
5/13/1997	9	0-3"	in.	11.10
5/13/1997	9	0-3"	in.	65.80
5/13/1997	10	0-3"	in.	7.11
5/13/1997	10	0-3"	in.	11.00
5/13/1997	11	0-3"	in.	23.60
5/13/1997	11	0-3"	in.	1.06
5/13/1997	12	0-3"	in.	3.68
5/13/1997	12	0-3"	in.	7.62
5/13/1997	13	0-3"	in.	5.47
5/13/1997	13	0-3"	in.	1.28
5/13/1997	14	0-3"	in.	1.29
5/13/1997	14	0-3"	in.	6.33
5/13/1997	15	0-3"	in.	8.14
5/13/1997	15	0-3"	in.	4.71
5/13/1997	16	0-3"	in.	2.62

Appendix B
South River Sediment Sample Results (Mercury)
DTI Waynesboro Plant

Collection Date	River Mile	Sediment Sample Depth		Mercury Concentration (mg/kg)
5/13/1997	16	0-3"	in.	3.52
5/13/1997	17	0-3"	in.	5.00
5/13/1997	17	0-3"	in.	4.53
6/16/1997	18	0-3"	in.	9.82
6/16/1997	18	0-3"	in.	3.44
6/16/1997	19	0-3"	in.	5.76
6/16/1997	19	0-3"	in.	8.04
6/16/1997	20	0-3"	in.	5.46
6/16/1997	20	0-3"	in.	6.30
6/16/1997	21	0-3"	in.	6.10
6/16/1997	21	0-3"	in.	3.28
6/16/1997	22	0-3"	in.	11.19
6/16/1997	22	0-3"	in.	3.53
6/16/1997	23	0-3"	in.	1.65
6/16/1997	23	0-3"	in.	7.78
6/16/1997	24	0-3"	in.	1.21
6/16/1997	24	0-3"	in.	2.20
6/16/1997	25	0-3"	in.	1.83
6/16/1997	25	0-3"	in.	5.45
7/7/1997	1.2			0.65
7/7/1997	2.4			3.37
7/7/1997	5.0			18.07
7/7/1997	5.2			16.20
7/7/1997	5.2			18.30
7/7/1997	5.2			5.84
7/7/1997	9.9			15.38
7/7/1997	10.3			16.75
7/7/1997	10.3			2.26
7/7/1997	10.3			3.32
7/7/1997	12.5			6.87
7/7/1997	12.5			6.58
7/7/1997	12.5			8.67
7/7/1997	19.9			7.35
7/7/1997	19.9			3.57
7/7/1997	19.9			5.23
7/7/1997	1.2			0.75
10/2	5.0	1	cm	10
10/2	5.0	3	cm	15
10/2	5.0	5	cm	9.1
10/2	5.0	7	cm	14.9
10/2	5.0	9	cm	22.9
10/2	5.0	11	cm	15.2
10/2	5.0	13	cm	10.9
10/2	5.0	15	cm	14.3
10/2	5.0	17	cm	23.3
10/2	5.0	19	cm	18.8

Appendix B
South River Sediment Sample Results (Mercury)
DTI Waynesboro Plant

Collection Date	River Mile	Sediment Sample Depth		Mercury Concentration (mg/kg)
10/2	5.0	22.5	cm	20.3
10/2	5.0	27.5	cm	26.1
10/2	5.0	32.5	cm	187
10/2	5.0	37.5	cm	398
10/2	5.0	42.5	cm	398
10/2	5.0	47.5	cm	471
10/2	5.0	52.5	cm	344
10/2	5.0	57.5	cm	242
10/2	5.0	62.5	cm	161
10/2	5.0	67.5	cm	324
10/2	5.0	72.5	cm	285
10/2	5.0	77.5	cm	269
10/2	5.0	82.5	cm	66.8
10/2	5.0	87.5	cm	218
10/2	5.0	92.5	cm	9.5
10/2	5.0	97.5	cm	2.6
10/2	5.0	1	cm	12
10/2	5.0	3	cm	10.3
10/2	5.0	5	cm	8.5
10/2	5.0	7	cm	7.7
10/2	5.0	9	cm	9.3
10/2	5.0	11	cm	7.4
10/2	5.0	13	cm	10.9
10/2	5.0	15	cm	7.1
10/2	5.0	17	cm	6.4
10/2	5.0	19	cm	7.2
10/2	5.0	22.5	cm	9.1
10/2	5.0	27.5	cm	13.8
10/2	5.0	32.5	cm	20.9
10/2	5.0	37.5	cm	28.8
10/2	5.0	42.5	cm	41.5
10/2	5.0	47.5	cm	289
10/2	5.0	52.5	cm	261
10/2	5.0	57.5	cm	179
10/2	5.0	62.5	cm	31.6
10/2	5.0	67.5	cm	27.4
10/2	5.0	72.5	cm	1.2
10/2	5.0	77.5	cm	0.23
10/2	5.0	82.5	cm	1.2
10/2	5.0	1	cm	4.8
10/2	5.0	3	cm	4.1
10/2	5.0	5	cm	5.1
10/2	5.0	7	cm	4.4
10/2	5.0	9	cm	5.2
10/2	5.0	11	cm	2.4
10/2	5.0	13	cm	0.19

Appendix B
South River Sediment Sample Results (Mercury)
DTI Waynesboro Plant

Collection Date	River Mile	Sediment Sample Depth		Mercury Concentration (mg/kg)
10/2	5.0	15	cm	1.1
10/2	5.0	17	cm	0.43
10/2	5.0	19	cm	0.64
10/2	5.0	22.5	cm	0.04 J
10/2	5.0	27.5	cm	0.023 J
10/2	5.0	32.5	cm	0.034 J
10/2	5.0	37.5	cm	0.026 J
10/2	5.0	42.5	cm	0.013 J
10/2	5.0	47.5	cm	0.014 J
10/2	5.0	52.5	cm	0.028 J
10/2	5.0	57.5	cm	ND
10/2	5.0	62.5	cm	ND
10/2	5.0	67.5	cm	0.025 J
10/2	5.0	72.5	cm	0.026 J
10/2	5.0	77.5	cm	ND
10/2	5.0	82.5	cm	0.022 J
10/2	5.0	87.5	cm	0.014 J

South River Sediment samples collected from DTI Plant (river mile 0) to confluence with the South Fork - Shenandoah River (river mile 25)

APPENDIX C

INDOOR AIR DATA SCREENING

Appendix C

Calculation of Industrial Groundwater Screening Levels for Vapor Intrusion (Indoor Air Evaluation)

From Appendix D of the Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils, Subsurface Vapor Intrusion Guidance, November 2002

The target groundwater concentration corresponding to a chemical's target indoor air concentration is calculated by dividing the target indoor air concentration by an appropriate attenuation factor and then converting the vapor concentration to an equivalent groundwater concentration assuming equilibrium between the aqueous and vapor phases at the water table.

Diffusion resistances across the capillary fringe are assumed to be accounted for in the value of α. The equilibrium partitioning is assumed to obey Henry's Law so that:

C_{gw} [mg/L] = $C_{target,ia}$ [mg/m^3] * 10^{-3} m^3/L * 1/H *1/α

Where:

C_{gw}	=	target groundwater concentration,
$C_{target,ia}$	=	target indoor air (PEL or TLV)
α	=	attenuation factor (ratio of indoor air concentration to source vapor concentration), used 0.001 from Table 2
H	=	dimensionless Henry's Law Constant at 25°C [(mg/L – vapor)/(mg/L – H_2O)] from EPA's Superfund Chemical Data Matrix (SCDM) database.

Groundwater to Indoor Air Evaluation
DTI Waynesboro Plant

Constituents	Well	Highest detected concentration (ug/l)	GW SL based on ACGIH TLV (mg/l)	GW SL based on OSHA PEL (mg/l)	Henry's Law Constant
Chlorobenzene	MW12	2J	303	2300	0.152
1,1-Dichloroethane	MW12	6	1760	1740	0.23
1,1-Dichloroethylene	MW12D	2J	18.7	NA	1.07
Trichlorofluoromethane	MW12D	3J	1410	1400	4.0
1,1,1-Trichloroethane	MW12	13	2710	2700	0.705
Toulene	MW13	5	691	2770	0.272

GW SL: Groundwater Screening Level
ACGIH TLV: American Conference of Governmental Industrial Hygienist Threshold Limit Value
OSHA PEL: Occupational Safety and Health Administration Permissible Exposure Levels